COBALT-DOPED SATURABLE ABSORBER Q-SWITCHES AND LASER SYSTEMS

ABSTRACT OF THE DISCLOSURE

A saturable absorber Q-switch includes a monocrystalline lattice having the formula $Mg_{1-x}Co_xAl_yO_z$ where x is greater than 0 and less than 1, y is greater than 2 and less than about 8, and z is between about 4 and 13. The lattice has tetrahedral and octahedral positions, and most of the magnesium and cobalt occupy tetrahedral positions. In one embodiment, the molar ratio of aluminum to the combined amount of magnesium and cobalt in the monocrystalline lattice can be controlled during growth of the monocrystalline lattice to thereby form a saturable absorber Q-switch that exhibits a $^4T_1$ spectrum for the cobalt ion of at least about 1544 μm. In another embodiment, a laser system, such as an Er:Yr:glass laser system, includes a saturable absorber Q-switch that includes a monocrystalline lattice wherein the molar ratio of aluminum to the combined amounts of magnesium and cobalt exceeds 2:1, and preferably is about 6:1, and wherein essentially all of the magnesium and cobalt components of the monocrystalline occupy tetrahedral positions of the lattice.